PRACTICE WHAT YOU PREACH: EXPERIENCES WITH TEACHING VIRTUAL WORLD CONCEPTS IN A VIRTUAL WORLD

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ABSTRACT

This chapter is not on the technology of Virtual Worlds. We discuss the application of a Virtual World as a teaching and learning environment for a course on Virtual Worlds. In our view, innovation and education should go hand in hand. Too often, new technologies are discussed without being applied. We argue that innovative technologies do belong in those classroom where their application is relevant to the topic. In this paper, we discuss an example of how this issue can be tackled. We show that application of innovative tools is useful to all parties: students, lecturers and researchers, even if it raises new problems from which we all can learn.

1. INTRODUCTION

The Digital Communication curriculum of the Hogeschool Utrecht (the Netherlands) has, as one of it's courses, a course on Virtual Worlds. As a strategic choice, the lecturers decided to rely on the same technology for the implementation of a learning and teaching environment.

New technologies in classroom offer opportunities for innovation. They also change the way students experience education. This can be challenging for educators who are confronted with unexpected situations. But use also promotes understanding. Through an assignment in a virtual world the students would gain more familiarity with the technology. The lecturers would get better acquainted with de didactic possibilities of the medium.

In this paper we share our observations from practice. We focus on the educational possibilities of virtual worlds with no preset narrative by describing the Virtual Worlds course, which partially took place in an Active Worlds environment. We discuss the advantages of moving part of the action to a virtual setting, but also point at its limitations. We describe some problems that were raised by the medium and offer strategies to deal with them.

We show how to improve our understanding of new media and technology by combining education with research. In particular we measured the students' experienced "connectedness" and "learning" in the time span of the course.

2. A VIRTUAL VILLAGE AS A COMMUNITY OF LEARNERS

Virtual worlds with no preset narrative, such as Active Worlds or Second Life, are considered usable asset in education (Livingstone and Kemp 2006). The implementation of the learning environment in a virtual world is not necessarily successful.

The "Virtual Worlds" course of the Digital Communication curriculum of the Hogeschool Utrecht (University of Applied Science, Utrecht, the Netherlands) combines traditional instructional methods (classroom setting) with a collective practical assignment in an Active Worlds world. Starting with the spring of 2008, the students are asked to build an application, consisting of 3D-model of a house and its surroundings, and to place it in a common village situated in an Active Worlds environment. Figure 1, as well as Figure 4 and 5, show examples of students' work during the courses we analyzed.

The complementary approach of the Virtual Worlds course works very well: collaboration continues naturally in both worlds, virtual and real (Benvenuti et. al, 2008). The spring 2008 edition of the course was very successful. The relation between the courses subject and the applied technology was a powerful combination. Other success factors might be the choice for an immersive collaborative structure, or the village metaphor.

The question whether a virtual village is an appropriate tool to support a community of learners is not one-dimensional. Sense of community is a subjective concept. Some students consider participating in a community equivalent to sharing results with colleagues, others expect the results to be produced together.

The same applies to learning: the students who pass an exam frequently don't agree on what they have learned, nor on its significance. In 2008, we had investigated the students' opinion about the way the course was taught and about their own attitude. Though the answers were obviously positive – the students stated having found themselves involved and participating in the learning community - we noticed a large variety of opinions on the usefulness and instructiveness of the collaboration in the virtual world.

Figure 1: the spring 2008 Asterix village: house of the bard and surroundings. ©2008 Hogeschool Utrecht, Used with permission

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With the introduction of the assignment in a common virtual world, the course's results had increased beyond the lecturers' expectations. In their opinion, this was due to the fact that the students had been able to learn from each other more than in the previous editions of the course. The students themselves seemed more cautious in sharing that conclusion.

In 2009, we had again the opportunity to perform measurements in the spring edition of the Virtual Worlds course. We decided to focus on the two issues mentioned above: experienced community membership and experienced learning.

3. MEASURING EXPERIENCED CONNECTEDNESS AND LEARNING

In our view, experience is not an isolated phenomenon, but a process in time, in which individuals interact with situations. During this process interpretation takes place: individual meaning is constructed. Therefore we consider experience a subjective and constructive phenomenon. Measuring experience should include assessment at three moments in time: the respondent's expectations before the experience, their assessment during the experience and afterwards (Vyas & van der Veer, 2006).

Vyas and van der Veer (2006) developed several strategies to assess the respondent's interpretation of the situation at different moments in time. Basically, they interview the respondents prior to the experience and afterwards. The assessment of the "living through" is done by observing the respondents who perform tasks while they talk aloud. This was not possible in a classroom setting, so we decided to assess the students' subjective impressions by conducting the same written survey at three moments in time.

A reliable tool for measuring subjective impressions is the Visual Analogue Scale. Visual Analogue Scales or VAS scales are used in the medical world for subjective magnitude estimation, mainly for pain rating. They consist of straight lines of 10.0 cm long, whose limits carry verbal descriptions of the extremes of what is being evaluated. Because the interval between the limits does not carry any verbal label, the exact location of the value that respondents mark will not be remembered, so with repeated measurements it is impossible that respondents just repeat their previous scores. VAS scales are of value when looking at changes in time within individuals (Langley & Sheppeard, 1985).

The impressions we were interested in are the student's sense of belonging to a community and the extent to which student's learning goals are met. The Classroom Community Scale or CCS (Rovai, 2002) was a good starting point. The CCS is a psychometric scale, developed using factor analysis with 2 principal components: Connectedness and Learning. Connectedness indicates the perceived cohesion, spirit, trust and interdependence between members of the classroom community. Learning represents their feelings regarding interaction with each other as they pursue the construction of understanding. Learning also indicates the degree to which they share values and beliefs concerning the extent to which their educational goals and expectations are being satisfied.

Our variant of the Classroom Community Scale applied VAS-scales instead of Likert scales because this prohibits memory of previous scores when applied to repeated measures.

4. THE ASTERIX VILLAGE

The "Virtual Worlds"- course (3rd year in the curriculum) takes seven weeks. The course's goal is to teach students to think about virtual worlds in a conceptual way. The students should learn to

establish when it is appropriate to make an application in a virtual world. Virtual worlds are powerful instruments, but developing a VR application can be very expensive. Sometimes a less demanding solution is better.

Half of the course is dedicated to theory, the other half is practical. Theory is assessed individually, with a written test. The course has two related practical assignments; in the laboratory the students work in pairs.

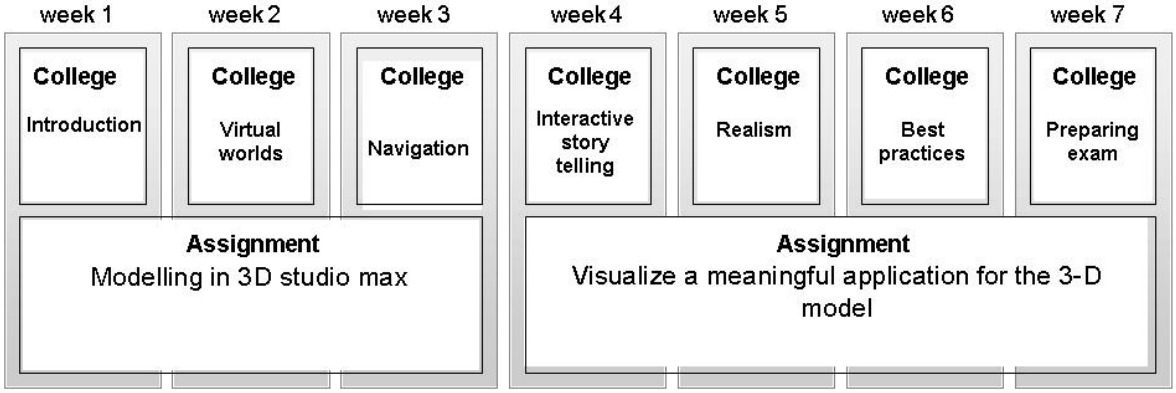

Figure 2: General course outline

The course starts with an introduction to virtual worlds. Design concepts within virtual worlds are discussed. In this part, students develop a VR model of a house and its environment in 3D Studio Max. In order to stimulate relations between individual designs, the lecturers introduced a common theme. In 2008 and 2009 the common theme was “Asterix”.

In the second part, theory focuses at the future of virtual worlds when artificial intelligence and photorealistic rendering increases. Students are also stimulated to find best practices. The focus switches to the second practical assignment which takes place in a shared Active Worlds context, the Asterix village. Active Worlds has no preset narrative; this triggers students to develop and implement interaction concepts individually as well as to develop these collaboratively for the entire village. The setting –a village– was chosen consciously, to obtain a common structure.

In the final weeks students reflect on the benefits of virtual worlds and of virtual worlds in cross-media concepts. At the end of the course students present their work in a plenary classroom meeting. Discussion and assessment of the practicum assignment also takes place in that meeting.

5. WHAT’S NEW, WHAT’S NEXT?

The spring 2008-edition of the Virtual Worlds-course was not the first one. The upper part of the course outline in Figure 2 also applies to previous editions, but those courses only had one practicum assignment: design and develop a new VR-concept. In 2008, the assignment in the shared virtual world was added. Nothing else changed. The teaching timetables remained unaltered. The class meets twice a week in the multimedia laboratory. Meetings last 2 hours. The first hour is dedicated to theory, during the rest of the time the students work on their assignments, in pairs. Students are – and always were - stimulated to ask questions to the lecturers and to ach other. Students are – and always were - stimulated to learn from each other.

Until the spring of 2008, students mainly exchanged information during laboratory time. If the lecturers were busy and a student had a well-defined question, it came naturally to ask other

students. With the introduction of the assignment in the Active World world this pattern changed. Now students also “met” while working in the virtual world from home, in the evening or at night. As we can see in Figure 3, Active Worlds has a chat box. Communication comes easily. The first improvement which came with Active Worlds lays in the increased possibilities for students to discuss issues while they are working, and to support each other on the spot without face to face contact.

This is a powerful feature. In the first edition of the Virtual Worlds-course in Active Worlds, implementing 3DS Max models into Active Worlds was challenging, since good tutorials had not been written yet. But the students succeeded to import their 3D-applications relatively fast by working as a group: one of them was very skilled in 3D developing and shared his knowledge generously. In the next editions of the course, the group had tutorials but lacked the experienced colleague. Technical problems seemed more difficult to overcome in that situation. In the spring of 2009, the lecturers added an extra meeting and invited an expert in 3DS Max and Active World to answer to the students’ questions.

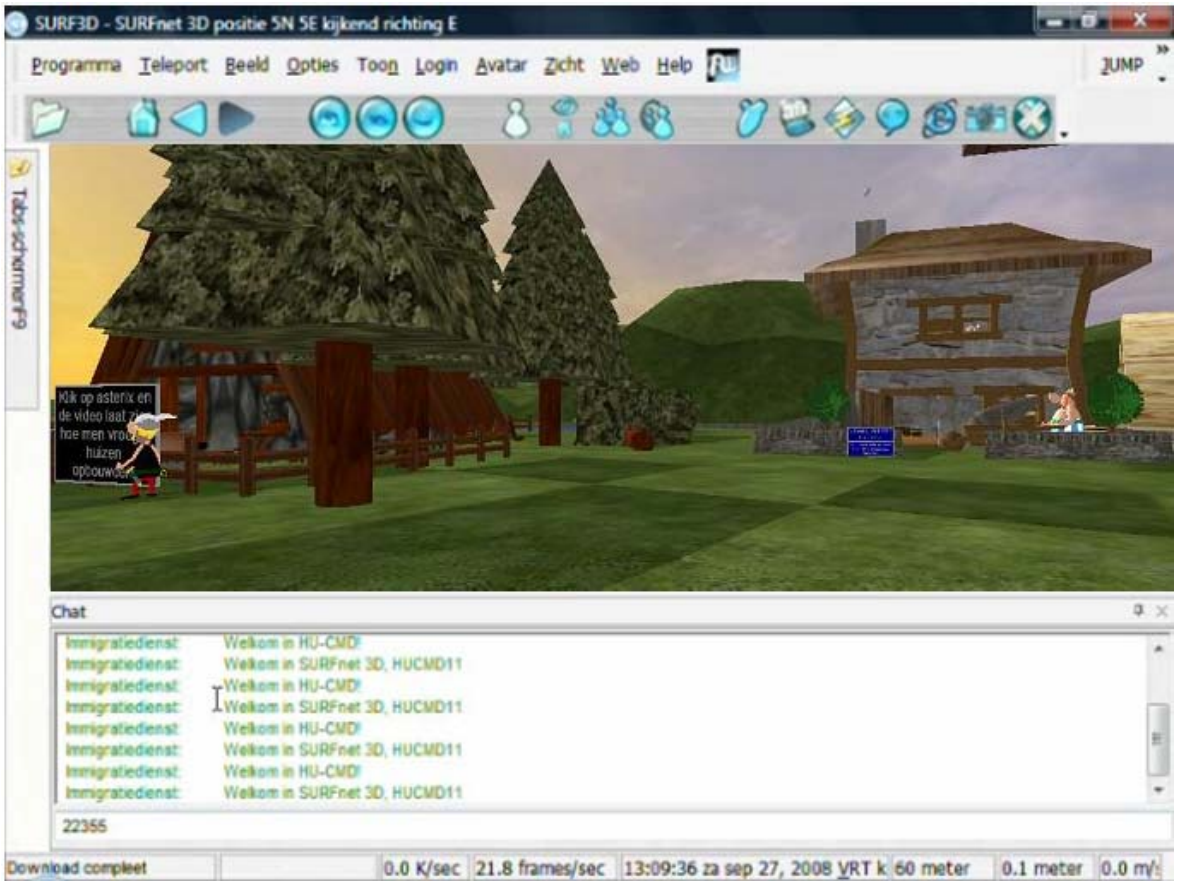

Figure 3: Active Worlds: the students’ perspective with the chat box.

The second improvement concerns the possibility to follow each others’ progresses. Before the introduction of the common virtual village, students only discussed each others’ work thoroughly during the conclusive meeting. These discussions always concerned the final versions of the products. While working in Active Worlds, students can follow the process of creation of all products. Every prototype is published and is visible for everybody. This triggers a fertile competition between the students: everybody wants his application to excel.

Software can be copied. The participants in the virtual village work in an open source environment: they can see and even copy parts of other students' work. This is very instructive and inspiring but also challenging. In 2008, one student had created animated smoke; a few days later most of the huts in the village had smoking chimneys (see Figure 4). This was disappointing for the student who had invested time in developing what he thought would be a unique feature. He felt robbed.

The lecturers wanted to encourage the students to share results, but they also wanted to grant the credits for interesting ideas to the right persons. An appropriate assessment policy had to be developed. 'Intellectual property" was discussed in classroom and a citation index was established. From that moment, copycat behaviour was not seen as "steeling" anymore but as a tribute to the conceiver of the particular feature.

The third improvement lies in the possibilities to share results, to learn and copy from each other.

Figure 4: The Spring 2008 Asterix village with the smoking chimneys. ©2008 Hogeschool Utrecht, Used with permission

Of course, the question was risen if it was appropriate to skip the traditional meetings and move the whole course to the virtual environment. The answer is negative. The traditional classroom setting offers opportunities to plenary discussion. This is difficulty to reproduce in a virtual environment, while it appears to be very useful. The problems concerning the intellectual property were discussed in classroom. Without the presence of all the students and their participation at the discussion it would not have been possible to come to a solution.

Presence is a cloudy concept in a virtual setting. Benvenuti et al (2008) discuss the case of a compulsory meeting in a virtual classroom, where the students had labelled their avatars with nicknames and made them misbehave. But even if the avatar is present and polite, it is difficult to tell if the student is.

Not everything turned out to be feasible. After the first edition, the lecturers had planned to store the "best practices" so that they could be re-used the next year. This way they wanted to

establish a canon of interesting, inspiring applications made by students. At the same time, they wanted to prevent new groups to start with an empty 'world'. This turned out to be too ambitious. The best applications needed too much memory, therefore the system slowed down too much. This idea was frozen until technology will support it.

In order to overcome the "empty world" feeling, the lecturers instructed one group of students to provide for different strategies to induce the experience of being part of a village structure. They did so by implementing a palisade to demarcate the border, a map of the village to support navigation and several means of transport to encourage exploration. An impression of those solutions is given in Figure 5.

Figure 5: Strategies to delimit the action. ©2009 Hogeschool Utrecht, Used with permission

6. PERCEIVED CONNECTEDNESS AND LEARNING

Our research goal was to investigate the students' experience on community membership and learning. First of all, we have to emphasize that conducting research in real-live educational setting is difficulty. We had the opportunity to witness two editions of the same course in two consecutive years, which is promising. In 2009 we collected data. But a course is not an experiment; there are many important variables we were not able to control, first of all, the composition of the group. But also the moment in time in the school's history, with the school starting a new program, and the lecturers' intermitted absence (because of illness and other personal circumstances) probably have had an impact on the way the course evolved.

Measuring experience included assessment of expectations prior to the experience, during the experience, and after the facts (Vyas, van der Veer, 2006). We measured the students' perception of belonging to a classroom community and their perception on accomplishing (subjective)

learning goals. We used the questions of the Classroom Community Scale (Rovai, 2002), structured along the Visual Analogue Scales (VAS) to identify changes within individuals (Langley & Sheppeard, 1985). These questions consist of 2 domains: Connectedness (10 questions) and Learning (10 questions), that are scored on an analogue scale from 0-10. We had to delete one item of the learning questionnaire because it was poly- interpretable to our Dutch audience.

In 2009, 15 students followed the Virtual Worlds-course. The survey was filled in the first meeting (week 1), again in the meeting where the students gained access to Active Worlds (week 4) and finally in the conclusive plenary meeting (week 8). 5 students were absent in one of more of those meetings, so our findings concern the 10 students who filled all the surveys.

We calculated the initial change in connectedness and in learning by subtracting the scale scores of week 4 from week 1, and calculated the later change by subtracting those of week 8 from week 4 for each individual. We calculated the significance of the change scores by applying the student t-test against the 0-hypothesis of no change in the population.

We found that the sensed/perceived "connectedness" increased significantly (Student t-test, $p<0.05$) in the first part of the course (between the start in week1 and week 4, when students meet each other and start collaborating) as well as in the second part (from week 4 to week 8, when the collaboration is continued in the virtual world). The sensed/perceived "learning" only grew significantly in the beginning of the course (between week 1 and week 4) even though new experiences as well as new designed artifacts were in fact (objectively) evident from the students' behavior in Active Worlds.

We expected connectedness to increase after the common virtual world was introduced, despite of the fact that by then the students were acquainted to each other. But the lack of increase of the perceived learning puzzles us. It is possible that the setting triggers ambitions that are difficult to fulfill. The software might be easier to learn than to master, especially if none of the community members has real expertise in 3D-programming. This can be an interesting starting point for further investigations.

7. CONCLUSIONS

The application of the Active Worlds environment to the Virtual Worlds course was a very fruitful step, to the students, the lecturers and the researchers.

The students gained insight into the possibilities of virtual applications, even if their satisfaction on their own learning leveled off in the last weeks.

The lecturers discovered new features – and new problems - of virtual worlds. They developed educational strategies on how to optimize the use of a virtual world as an educational tool an how to cope with the problems it entails.

The researchers had the opportunity to test their hypotheses on the effect of the application of this new technology in education, and to formulate new research goals.

We summarize our findings.

Common assignments in a Virtual World lead to:

- Increased possibilities for students to support each other on the 'virtual' spot. This is traditionally an advantage of face2face meetings. Now, at any time (and from any location) students turned out to be able to discuss with their colleagues online.
- The possibility to follow each others' progress, which is inspiring and stimulating.
- The possibilities to share results, to learn and copy from each other in an 'open source' setting.

- A stronger sense of community. The perceived sense of connectedness, of belonging to a community, increases when the students collaborate in a virtual world as a group.

Traditional classroom meetings are still useful:

- To support plenary discussions.
- To capitalize the historical knowledge of classroom teaching. The lecturers intended to "reuse" the best practices by keeping them in the virtual village during the following editions of the course, to establish a canon of inspiring applications. Current technology does not (yet) support this option.

We found new questions for further discussion and research:

- Allow students to collaborate and even to copy from each other asks for a re-design of the assessment policy.
- Why does the perceived learning level?

Our recommendation is: practice what you preach in classroom and use the opportunities this combination offers to learn. Even if the topic of discussion is a moving target, indeed, precisely in that case it is important to rely on one's own experience to draw one's own conclusions.

AKNOWLEDGMENTS

We thank the lecturers of the Virtual Worlds course, Bob Cruijsberg and Geeske Bakker, for having admitted us in their classroom. We also thank the students of both courses for their cooperation and their products.

REFERENCES

Benvenuti, L., E.J Hennipman, E.J. Oppelaar, G.C. van der Veer, B. Cruijsberg, G. Bakker (2008). Experiencing Education with 3D Virtual Worlds. In Kinshuk, D. G. Sampson, J. M. Spector, P. Isaías, & D. Ifenthaler (Eds.), *Proceedings of the IADIS International Conference on Cognition and Exploratory Learning in the Digital Age* (pp. 295-300). IADIS: Freiburg, Germany.

Dede, C. (1995). The Evolution of Constructivist Learning Environments: Immersion in Distributed, Virtual Worlds. *Educational Technology* **35**(5): 46-52.

Dickey, M. D. (2005). Three-dimensional virtual worlds and distance learning: two case studies of Active Worlds as a medium for distance education. *British Journal of Educational Technology* **36**(3): 439

Eliëns, A., F. Feldberg, E. Konijn and E. Compter (2007). VU @ Second Life: Creating a (Virtual) Community of Learners. *EUROMEDIA 2007*. Delft, Netherlands.

Langley GB, Sheppeard H. (1985) The visual analogue scale: its use in pain measurement. *Rheumatology International* 1985; 5(4):145-8

Livingstone, D. and J. Kemp (2006). Massively Multi-Learner: Recent Advances in 3D Social Environments. *Computing and Information Systems Journal* **10**(2).

Rovai, A.P. (2002) Developing an instrument to measure classroom community, *Internet and Higher Education* 5, pp.197-211.

VU University Amsterdam. (2007). *VU Second Life*. Retrieved May 28, 2008, from http://www.vu.nl/secondlife.

Vyas, D. and G.C. van der Veer (2006). *Rich evaluations of entertainment experience: bridging the interpretational gap.* 13th European Conference on Cognitive Ergonomics, 2006, Switzerland. pp. 137-144.

ADDITIONAL READING SECTION

Dewey, J. (1934). *Art as Experience.* New York: Perigree.

Garrett, J.J. (2002). *The elements of user experience: User-centred design for the Web.* Indianapolis: New Riders Publishers.

Jafari, A., McGee, P., & Carmean, C., (2006). *Managing courses, defining learning:*

What faculty, students, and administrators want. EDUCAUSE Review, 41(4), 50–71.

http://www.educause.edu/apps/er/erm06/erm0643.asp

Jonassen, D.H., Land, S.M. (2000) *Theoretical Foundations of Learning Environments.*

Lawrence Erlbaum Associates

Hannafin, M.J., Land, S.M. (1997). *The foundations and assumptions of technology enhanced*

student-centered learning environments. Instructional Science (25): 167-202

Hsi, S., Soloway, E. (1998) *Learner-Centered Design: Addressing, Finally, The Unique*

Needs Of Learners, CHI 98 (ACM Workshop)

McCarthy, J., Wright, P. (2004). *Technology as Experience.* MIT Press, Cambridge, MA.

Norman, D. (2004). *Emotional Design.* Basic Books: New York.

Vyas, D., van der Veer, G.C. (2005). *Experience as Meaning: Creating, Communicating and Maintaining in Real-Spaces.* In the Interact-2005 workshop on Space, Place, Experience in HCI. Proceedings at, http://www.infosci.cornell.edu/place/16_DVyas2005.pdf

Woolfolk, A. (2004). *Educational Psychology. (9th ed)*. Boston: Allyn and Bacon.